

1. Findings

The purpose of this report is to collect economic information regarding the production and sales of candles and incense in the US, including information about imports. A second objective is to review the scientific literature regarding emission rates and potential human health effects associated with burning candles and incense. The following is a brief overview of the findings.

1.A ECONOMIC DATA ON CANDLE AND INCENSE PRODUCTION AND SALES

- The Census Bureau reports 107 manufacturing establishments; however, industry estimates range from 160 to over 200 manufacturers. Many manufacturers are very small.
- Candle sales have been growing rapidly in the last 10 years (10 to 15 percent per year), fueled by consumer interest in aroma therapy and increased demand for home fragrance products in general.
- The Census Bureau reports a total value of shipments in 1997 of \$968 million; industry estimates put 1999 sales at \$1.3 billion just for scented candles, and up to \$2.3 billion for all candles.
- The top five countries that export candles to the US are China, Taiwan, England, Hong Kong, and Mexico.

- There are no public data on incense manufacturers; private data show at least 26 manufacturers. Limited discussions with some industry representatives indicate that there are probably many more very small manufacturers.
- The top five countries that export incense to the US are India, China, Thailand, Japan, and Hong Kong.

1.B POTENTIAL INDOOR AIR QUALITY IMPACTS OF BURNING CANDLES AND INCENSE

- Burning candles containing lead core wicks can result in indoor air concentrations of lead above EPA-recommended thresholds.
- In the scientific literature we reviewed, zinc and tin were found not to be emitted at concentrations that would raise concerns when burned indoors.
- One study showed worst-case scenario concentrations of acrolein, formaldehyde, and acetaldehyde from candle emissions exceeding EPA-recommended thresholds.
- Sooting can occur when combustion conditions are impaired when burning candles. Scented candles are more likely to produce soot than unscented candles. Sooting can

cause property damage by blackening surfaces. We could not identify any studies on potential human health effects associated with soot from candles.

- Several studies indicated links between exposure to incense smoke and health effects, including cancers and contact dermatitis. A few studies indicated possible mutagenic and genotoxic effects.
- Studies that examined the emissions of specific contaminants from incense smoke indicated that benzene and particulate matter may be emitted at concentrations that could pose human health risks.